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मानक

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“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 12207 (2008): Agricultural tractors - Recommendations on selected performance characteristics [FAD 11: Agricultural Tractors and Power Tillers]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
कृषि ट्रैक्टर — चुने हुए कार्यकारिता
मापदण्डों की सिफारिशें
(दूसरा पुनरीक्षण)

Indian Standard

AGRICULTURAL TRACTORS — RECOMMENDATIONS
ON SELECTED PERFORMANCE CHARACTERISTICS
(*Second Revision*)

ICS 65.060.10

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Agricultural Tractors and Power Tillers Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard was first issued in 1987. Subsequently, it was revised in 1999 based on the feedback by the Central Farm Machinery Training and Testing Institute, Budni on the tolerances limit of some of the selected characteristics of agricultural tractors.

This revision of standard is adoption of the 'Minimum Performance Standard', issued by the Ministry of Agriculture for the purpose of institutional financing. Though test methodology for various characteristics of the tractors has been covered in a number of Indian Standards, for the guidance of testing authorities, a need was felt to stipulate limits of some of the selected characteristics which are functionally important.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AGRICULTURAL TRACTORS — RECOMMENDATIONS ON SELECTED PERFORMANCE CHARACTERISTICS

(*Second Revision*)

1 SCOPE

The standard covers the following:

- a) Tolerances on the values declared by the manufacturer and in certain cases minimum/maximum values of the performance characteristics and statutory requirements under the relevant Act(s) of the agricultural tractors, and
- b) Criteria for determining variants and new model of tractors for the purpose of testing and certification.

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
IS 4468 (Part 1) : 1997	Agricultural wheeled tractors — Rear-mounted three-point linkage: Part 1 Categories 1, 2, 3, and 4
IS 4931 : 1995	Agricultural tractors — Rear-mounted power take off Types 1, 2, and 3
IS 5994 : 1998	Agricultural tractor — Test code
IS 11082 : 1984	Technical requirements of agricultural tractors for wet land cultivation
IS 11821 (Part 1) : 1992/ ISO 3463 : 1989	Method of test and acceptance conditions for protective structures of agricultural tractors: Part 1 Dynamic test
IS 11821 (Part 2) : 1992/ ISO 5700 : 1989	Method of test and acceptance conditions for protective structures of agricultural tractors: Part 2 Static test
IS 12062 : 1987	Method of measurement of exhaust smoke emitted by agricultural tractors

<i>IS No.</i>	<i>Title</i>
IS 12343 : 1998	Agricultural tractors — Operators seat technical requirements
12362 (Part 3) : 1994/ISO 6489- 3 : 1992	Agricultural vehicles — Mechanical connections on towing vehicles: Part 3 Tractor drawbar
IS 12953 : 1990	Drawbar for agricultural tractors — Link type — Specification

3 TERMINOLOGY

3.1 Confidential Test

The test conducted for providing confidential information on the performance of tractor whether ready for commercial production or not, or to provide any special data that may be required by the manufacturer/applicant.

3.2 Commercial Test

The tests conducted for establishing performance characteristics of tractors that are ready for commercial production or already in production.

3.2.1 Initial Commercial Test

The tests conducted on indigenous or imported prototype of tractor ready for commercial production.

3.2.2 Batch Test

The tests conducted on tractors which have already undergone initial commercial test and are being manufactured/sold commercially in the country.

3.2.3 Repeat Test

The tests conducted on tractor, to validate the performance or to ascertain the reoccurrence of breakdown/defects observed in earlier tests, for the same parameter and on the same sample under the test after rectifying the defects or after replacing the defected part by new part of the same specifications, or on fresh sample of same specification.

3.2.4 Supplementary Test

Supplementary test is conducted on tractor in case of not meeting the performance requirement after the

repeat test. The test is conducted to validate the performance or to ascertain the reoccurrence of the breakdown/defects observed in earlier tests for the same parameter and on the same sample under test after rectifying the defects or after replacing the defected part by new part of same specifications/revised specifications with improved design, or on fresh sample of same specifications/revised specifications with improved design.

3.3 Evaluative Requirements

Requirements under this category are the ones which are mandatory for acceptance of the tractor for the purpose of subsidies/NABARD financing. The testing agency will assess the performance of the tractor under test and release the report.

3.4 Non-evaluative Requirements

Requirements under this category are the ones which are not mandatory for acceptance of the tractor for the purpose of subsidies/NABARD financing. However, the authorized testing agency may observe the performance for these requirements and record in the test report.

4 ACCEPTANCE CRITERIA FOR PERFORMANCE CHARACTERISTICS

The product may be accepted for performance after confirming compliance to all evaluative requirements.

Performance characteristics of tractor along with the tolerances with respect to the declared values and in certain cases minimum/maximum values are given in Tables 1 and 2.

NOTE — In case of a parameter not meeting evaluative requirements of this standard, the 'Repeat Test' as defined above in 3.2.3 may be conducted. In case the parameter not meeting the evaluative requirement during the Repeat Test, 'Supplementary Test' as defined above may be conducted.

5 ACCEPTANCE CRITERIA IN CASE OF BREAKDOWNS/DEFECTS

5.1 The product may be accepted subject to the following conditions:

- a) There is no 'critical breakdown' during its validation after all tests including Repeat/Supplementary tests;
- b) There are not more than two 'major breakdowns' and neither of them is of repetitive nature;
- c) There are not more than five 'minor defects' during the test and the frequency of each is not more than two; and
- d) In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.

NOTE — In case of single critical breakdown/not more than two major breakdowns and neither of them being repetitive in nature/not more than five minor defects and their frequency being not more than two, the 'Repeat Test' as defined in 3.2.3 may be conducted.

5.2 In case of reoccurrence of breakdowns/defects during the Repeat Test, 'Supplementary Test' as defined in 3.2.4 may be conducted.

5.3 In case of multiple consequential failures resulting from a single defect/breakdown, the primary single defect/breakdown shall only be counted.

5.4 Categorizations of defects in terms of 'Critical', 'Major' and 'Minor' for various sub-assemblies/parts are provided in the Annexes A, B and C.

6 GUIDELINES FOR SUPPLEMENTARY TEST

6.1 In case the fresh sample is required for carrying out supplementary test, the model will have to be ascertained as being the same model as tested earlier (Under Initial Commercial Test), by the following checks:

- a) Specification in full,
- b) Two hour maximum PTO HP test under normal ambient conditions, and
- c) Nominal speed.

6.2 In case of request received for supplementary test for certain parameters of the sample, the Testing Authority may carry out other relevant test(s) also in consultation with the applicant.

6.3 If a sample is accepted for supplementary test and during test period or subsequently (before release of test report), it is found not being the same model as tested earlier under ICT, the further test on the sample would be stopped and applicant would be asked to withdraw the sample from test. However, incomplete Test Report, on tests, already carried out, shall be released under Confidential Test.

7 TEST REQUIREMENTS

7.1 The Initial Commercial Test of tractor shall be made compulsory to meet the requirements of field worthiness of the tractor.

7.2 The field test duration for Initial Commercial Test will be 35 h with plough and Rotavator operations including wetland cultivation, if applicable and for batch test no field test will be conducted, if no major breakdowns are observed in the field test during ICT of the tractor.

7.3 First Batch Test shall be carried out after 3 years from the date of release of Initial Commercial Test Report and subsequent Batch Tests after a period of 5 years from the previous batch test. If tractor meets the

Table 1 Parameters Applicable for Qualifying Minimum Performance Criteria
(Clause 4)

Sl No.	Characteristic	Category (Evaluative/Non-evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
I	PTO Performance:				
a)	Maximum power under 2 h test, kW (hp)	Evaluative	(To be declared by the manufacturer)	Declared value to be achieved with a tolerance of $^{-5}_{+10}$ per cent for PTO Power > 35 hp $^{-7.5}_{+10}$ per cent for PTO Power ≤ 35 hp	—
b)	Power at rated engine speed, kW(hp)	Non-evaluative	do	do	—
c)	Specific fuel consumption corresponding to maximum power, g/kWh (g/hph)	Non-evaluative	do	±5 percent	—
d)	Maximum equivalent crankshaft torque, Nm	Non-evaluative	do	±8 percent	—
e)	Back-up torque, percent	Non-evaluative	7 percent, <i>Min</i>	Nil	—
f)	Maximum operating temperature (°C):				
	1) Engine oil	Non-evaluative	(To be declared by the manufacturer under high ambient conditions)	Nil	The declared value should not exceed the maximum value specified by the oil company and the observed value under high ambient conditions should not exceed the declaration
	2) Coolant	Evaluative	do	Nil	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient conditions should not exceed the declaration
g)	Engine oil consumption, g/kWh (g/hph)	Evaluative	Not exceeding one percent of SFC at maximum power under high ambient conditions		The value would be based on the test conducted under high ambient condition
h)	Smoke level	Evaluative	Maximum light absorption coefficient of 3.25/m or equivalent BOSCH No. 5.2 or 75 Hatridge Value (as per CMVR)	Nil	Maximum smoke level shall be reported out of six readings tested as per IS 12062 and observed value should be well within the required limits
II	Belt Pulley Performance (If Desired by Manufacturer):				
a)	Power at rated engine speed	Non-evaluative	(To be declared by the manufacturer)	Declared value to be achieved with a tolerance of: $^{-5}_{+10}$ percent for PTO Power > 35 hp $^{-7.5}_{+10}$ percent for PTO Power ≤ 35 hp	—
b)	Power at standard linear belt speed [(15.75 ± 0.25) m/s]	Non-evaluative	do	do	—
c)	Maximum operating temperature of oil in the belt pulley housing, °C	Non evaluative	do	Nil	The declared value should not exceed the maximum value specified by the oil company and the observed value under high ambient condition should not exceed the declaration

Table 1 (Continued)

SI No.	Characteristic	Category (Evaluative/Non-evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
III	Drawbar Performance:				
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip or 7 percent track slip, kN (kgf)	Non-evaluative	Minimum 65 percent of static mass with ballast	±10 percent	—
b)	Maximum drawbar pull without ballast (or) with standard ballast corresponding to 15 percent wheel slip or 7 percent track slip, kN (kgf)	Evaluative	Minimum 65 percent of static mass of tractor without ballast (or) with standard ballast	Nil	—
c)	Maximum drawbar power without ballast, or with standard ballast, kW (hp)	Evaluative	Minimum 80 percent of PTO power as referred in SI No. I(a) of PTO performance	—	—
d)	Maximum transmission oil temperature	Non-evaluative	To be declared by manufacturer	—	The declared value should not exceed the maximum value specified by oil company
IV	Power Lift and Hydraulic Pump Performance:				
a)	Maximum lifting capacity throughout the range of lift, kN (kgf):				
1)	At the hitch point	Non-evaluative	To be declared by manufacturer	-10 percent	—
2)	With the standard frame	Evaluative	The lift capacity should at least be 18 kg/PTO hp and it should be 16 kg/engine hp where the tractor is not provided with a PTO shaft	Nil	—
b)	Maximum drop in the height of the point of application of the force after each 5 min interval for a total duration of 30 min, mm	Non-evaluative	To be declared by manufacturer	+5 mm	—
V	Brake Performance at 25 kmph:				
a)	Maximum stopping distance at a force equal to or less than 600 N on brake pedal with ballast, m:				
1)	Cold brake	Evaluative	10 m	Nil	—
2)	Hot brake	Evaluative	10 m	Nil	—
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ²	Evaluative	600 N	—	—
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes/No	Nil	Based on the test conducted, Yes/No as applicable should be indicated
VI	Noise Measurement:			Nil	
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	Nil	—
b)	Maximum noise at operator's ear level dB(A)	Evaluative	do	Nil	—
c)	Amplitude of mechanical vibrations at:	Non-evaluative	100 microns, Max	—	—
1)	Foot rest (left and right)	do	100 microns, Max	—	—
2)	Seat (with driver seated)	do	100 microns, Max	—	—
3)	Steering wheel				
VII	Haulage requirements:				
a)	Gross mass of the trailers	Non evaluative	To be specified by manufacturer	—	—
1)	2 wheel				
2)	4 wheel				

Table 1 (Concluded)

Sl No.	Characteristic	Category (Evaluative/Non-Evaluative)	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
	b) Distance travelled/litre of fuel consumption, km/l	Non-evaluative	To be specified by manufacturer	—	—
	c) Fuel Consumption (ml/km/gross mass tonne)	Non-evaluative	do	—	—
VIII	Wet Land Cultivation: Sealing for the following assemblies: a) Clutch Assembly b) Brake housing c) Front axle hubs	Evaluative	The identified assemblies should essentially meet the requirement of IS 11082 No water ingress in the identified assembly given in col 2 NOTE — Water droplets due to condensation not to be considered as water ingress.	—	If tractor does not meet the requirements of wet land cultivation, it may be recommended for dryland operation only
IX	Safety Features: a) Guards against moving and hot parts	Evaluative	As per CMVR	—	—
	b) Lighting arrangement	Evaluative	As per CMVR	—	—
X	Labelling of Tractors: Provision of labelling plate	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	—	—
XI	Discard Limit for: a) Cylinder bore diameter	Evaluative	To be specified by the manufacturer	—	—
	b) Cylinder ovality and taper	Non-evaluative	do	—	—
	c) Piston diameter	Non-evaluative	do	—	—
	d) Ring end gap	Evaluative	do	—	—
	e) Ring groove clearance	Evaluative	do	—	—
	f) Diametrical clearance of main bearing	Evaluative	do	—	—
	g) Diametrical and axial clearance of big or small end bearing	Evaluative	do	—	—
	h) Crankshaft end float	Evaluative	do	—	—
	j) Clearance between kingpin and bush	Non-evaluative	do	—	—
	k) Clearance between centre pin and bush	Non-evaluative	do	—	—

Table 2 Optional Requirements
(Clause 4)

Sl No.	Characteristic	Requirement	Tolerance	Remarks
(1)	(2)	(3)	(4)	(5)
i)	Air cleaner oil pull over	0.25 percent, <i>Max</i>	—	—
ii)	Seating requirements	Should meet the requirements of IS 12343 (As amended from time to time)	—	—
iii)	Fitment of ROPS	With a provision for fitment of ROPS. If ROPS fitted it should meet the requirement of IS 11821 (As amended from time to time)	—	—
iv)	Technical requirements for PTO shaft	Should meet the requirements of IS 4931 (As amended from time to time)	—	—
v)	Dimensions of three point linkage	Should meet the requirements of IS 4468 (Part 1) (As amended from time to time)	—	—
vi)	Specifications of linkage and swinging drawbars	Should meet the requirements of IS 12953 and IS 12362 (Part 3) (As amended from time to time)	—	—
vii)	Accessories	Trailer hitch, front tow hook, linkage drawbar may be provided	—	—

requirements of this standard during the first Batch Test, no further Batch Test for that model of machine may be required.

7.4 The Batch Test of the variant model shall also be regulated as per **7.3**.

8 CRITERIA FOR DETERMINING NEW MODEL OF TRACTORS

8.1 Fixation of Base Model with Its Variants Within Certain Parameters

A Base Model shall be defined as the one, which has defined specifications. Manufacturer will specify the Base Model along with list of variants, which could be added or deleted or supplemented to arrive at variants of the subject Base Model. The tractor will be tested as per relevant IS and Initial Commercial Test (ICT) Report duly released.

8.2 Beyond the above definition of Base Model and its variants, other changes would not be considered as Model Change.

8.3 All the variants and their identifiable configuration shall appear in the Test Report of the Base Model.

8.4 For variants, the following checks shall be made (on fresh sample only) for conformity of sample as being the same as tested earlier:

- a) Specification in full, and
- b) Two hour maximum PTO HP test under normal ambient conditions (wherever required as mentioned in col 4 of Table 3).

8.5 For variants which can be converted at test site, the variant model can be derived by adding or deleting the variant features in the same sample of base model and if any tests are required, the same can be conducted on the derived variant tractor. If manufacturer desires, a separate variant tractor may be submitted and the relevant tests may be carried out.

8.6 Variants

The variant model(s) may be arrived from a Base Model by the addition/deletion/supplementation of any one or more of the following features. The variants shall be subjected to test(s) as stated against each feature of variant (*see* Table 3).

8.7 Wherever only physical inspection on the variant tractor is required as per the above table, the inspection can be carried out, in consultation with the Testing Authority, at manufacturer's site or at the manufacturer's dealer's site near testing institute.

8.8 Difference between Base model, Variant and a New Model is given in Table 4.

Table 3 Determination of Variants
(Clauses 8.4 and 8.6)

Sl No.	Features of Variant	Tests/Inspection That will be Required on the Feature of Variant	Whether Two Hours PTO Test (Under Natural Ambient Conditions) Required
(1)	(2)	(3)	(4)
i)	Single/dual/dry/wet/independent clutch/increase in size of clutch	No test required. Only physical inspection	No
ii)	Specification of dry/wet air cleaner, its location etc	a) Physical inspection only if air cleaner is changed from wet to dry type b) Air cleaner oil pull over test as per IS 5994 if the air cleaner is changed from dry to wet type or combination thereof	No
iii)	Location and routing of exhaust system	No test required. Physical inspection	No
iv)	Location and type of operating controls like pedal, gear shift levers, differential lock etc	Inspection against the relevant standard(s)	No
v)	Different types of gear box with or without synchronizers, constant mesh etc	Nominal speed test	Yes
vi)	Addition of number of speeds with add-on modules and modifications in gear ratios to meet end customer requirements resulting in variations less than or equal to 15 percent of the nominal speed in maximum speed measured on Base Model	Nominal speed test	Yes

Table 3 (Concluded)

Sl No.	Features of Variant	Tests/Inspection That will be Required on the Feature of Variant	Whether Two Hours PTO Test (Under Natural Ambient Conditions) Required
(1)	(2)	(3)	(4)
vii)	Fitment/change of engine accessories such as Air compressors, radiators, oil coolers, water separators, expansion tank with special coolant, additional hydraulic pumps, fuel tanks etc	a) If capacity of radiator is reduced by more than 10 percent of that of base model or the oil cooler is removed, then engine/PTO test under high ambient condition to be conducted b) No test required only physical inspection in other cases	Yes —
viii)	Power/hydrostatic/manual steering systems	Inspection against the CMVR requirements	No
ix)	Type and increase in size of brake systems-disc, drum, oil immersed brakes	Inspection against the CMVR requirements	No
x)	Type of actuation systems for brake and clutch (mechanical/hydraulic/pneumatic)	<i>For Brakes:</i> Inspection against the CMVR requirements <i>For Clutch:</i> No test required. Only physical inspection and measurement of actuation force	No —
xi)	Provision of accessories like drawbars, towing hooks, spark arrestors etc (Manufacturers may recommend minimum and maximum towing heights)	Inspection against relevant Indian Standards	Yes, in case of spark arrester only
xii)	Types of three point linkages such as Categories No. 1, 2, 3 or 4 of IS 4468 (Part 1), rear or front mounted	Inspection against relevant Indian Standards	No
xiii)	Location and type of PTO shaft(s), standard and optional speeds	Inspection against relevant Indian Standards	No
xiv)	Alternate specification, features and location of electricals and instrumentation	Inspection against relevant Indian Standards	No
xv)	Different tyre sizes — front and rear	No test is required when one step up/lower tyres are used on the recommended rim (as per CMVR). If more than one step up or lower tyres are used then: a) Drawbar performance test b) Brake test	No — —
xvi)	2 WD or 4 WD drive	No test is required when base model is 4 WD and variant is 2 WD If the base model is 2 WD and variant is 4 WD then drawbar performance test	No Yes
xvii)	Sheet metal/styling including colour and decals/sticker change and any change in model name, when base model name also exists	Physical verification and visibility test in case of change in sheet metal styling	No
xviii)	Position and type of hydraulic pump drive	Physical inspection. No test is required if the pump speed remains same	No
xix)	Positioning of hydraulic sensing mechanism (like lower link, top link, etc)	Physical verification	No
xx)	Change related to ergonomics, safety, and comfort	Inspection against relevant Indian Standards	No
xxi)	Change in the location and type of final reduction or brake location without affecting the theoretical speeds meeting at Sl No. (vi)	Nominal speed test	No
xxii)	Type of FIP — Inline/Rotary/Common rail	a) No test if the declared power is within the tolerance specified in Table 4 b) If variation exceeded, then PTO performance test	No (If declared power exceeds tolerance limit specified in Table 4 and 2 h PTO test to be conducted)
xxiii)	Change related to statutory/regulatory requirements	a) No test, if engine power, displacement and rated speed is maintained within base model tolerance as specified in Table 3 b) Inspection as per CMVR requirements etc	No —

Table 4 Difference Between Base Model, Variant and a New Model
(Clause 8.8)

SI No.	Parameters	Base Model	Variant	New Model
(1)	(2)	(3)	(4)	(5)
i)	Engine operating principle (spark/compression ignition, two/four stroke)	No change	No change	Change
ii)	No. and arrangement of cylinders	No change	No change	Change
iii)	Engine power	Power variation not exceeding 10 percent of declared value	Power variation exceeding 10 percent but not exceeding 20 percent of the declared values	Power variation above 20 percent of declared value
iv)	Engine displacement	Variation in Engine displacement subject to qualifying power-variation as mentioned in SI No. (iii) of this table	Variation in Engine displacement subject to qualifying power-variation as mentioned in SI No. (iii) of this table	Variation in Engine displacement subject to qualifying power-variation as mentioned in SI No. (iii) of this table
v)	Rated engine speed	Variation in rated engine speed subject to qualifying power-variation as mentioned in SI No. (iii) of this table	Variation in rated engine speed subject to qualifying power-variation as mentioned in SI No. (iii) of this table	Variation in rated engine speed subject to qualifying power-variation as mentioned in SI No. (iii) of this table

NOTES

- 1 The term 'Declared value' in the above table refers to the declared value of the base model tested under ICT.
- 2 Tractor/EngineModel name of any variant tractor can be entirely or partially different from base model tractor/engine.
- 3 The manufacturer can opt for model change even if the parameters at SI No. (iii), (iv) and (v) are met.

ANNEX A

(Clause 5.4)

CATEGORIES OF BREAKDOWNS/DEFECTS (TRACTORS)
(Critical Breakdowns)

Code	Aggregate	Critical Defects	Sub-assembly/Part	Applicable Norms
(1)	(2)	(3)	(4)	(5)
C 1	Engine	Engine seizure	Piston-liner	As under col 3 and 4
C 2	do	do	Main/big end bearings	do
C 3	do	Breakage of	Piston	do
C 4	do	do	Connecting rod	do
C 5	do	do	Crankshaft	do
C 6	do	do	Lub oil pump	do
C 7	do	do	Fuel injection pump	do
C 8	do	do	Governor	do
C 9	do	do	Cylinder block	do
C 10	do	do	Cylinder head	do
C 11	do	do	Valve gear	do

<i>Code</i>	<i>Aggregate</i>	<i>Critical Defects</i>	<i>Sub-assembly/Part</i>	<i>Applicable Norms</i>
(1)	(2)	(3)	(4)	(5)
C 12	Transmission	Breakage of	Clutch housing	As under col 3 and 4
C 13	do	do	Gear box housing	do
C 14	do	do	Axle housing	do
C 15	Steering System	do	Steering gear	do
C 16	do	do	Steering shaft	do
C 17	do	do	Steering wheel	do
C 18	do	do	Steering drop arms	do
C 19	do	do	Drag links	do
C 20	do	do	Tie rods	do
C 21	do	do	Steering knuckles	do
C 22	Brake system	do	Actuating linkage parts	do
C 23	Front Axle	do	Front axle	do
C 24	do	do	Stub axle	do
C 25	do	do	Kingpin	do
C 26	do	do	Front axle support	do
C 27	do	do	Pivot pin and lock	do
C 28	do	do	Radius rod	do
C 29	Wheel Equipment	do	Wheel hub	do
C 30	do	do	Wheel rim	do
C 31	do	do	Wheel disc	do

ANNEX B

(Clause 5.4)

CATEGORIES OF BREAKDOWNS/DEFECTS (TRACTORS) (Major Breakdowns)

<i>Code</i>	<i>Aggregate</i>	<i>Critical Defects</i>	<i>Sub-assembly/Part</i>	<i>Applicable Norms</i>
(1)	(2)	(3)	(4)	(5)
Mj 1	Engine	Breakage/Crackage of	Fan blade	As under col 3 and 4
Mj 2	do	do	Oil sump	do
Mj 3	do	do	Water pump	do
Mj 4	do	do	Fuel tank	do
Mj 5	do	do	Radiator	do
Mj 6	Transmission	do	Clutch assembly	do
Mj 7	do	do	All gearing elements	do

<i>Code</i>	<i>Aggregate</i>	<i>Critical Defects</i>	<i>Sub-assembly/Part</i>	<i>Applicable Norms</i>
(1)	(2)	(3)	(4)	(5)
Mj 8	Transmission	Breakage/Crackage of	All shaft elements	As under col 3 and 4
Mj 9	do	do	All bearings	do
Mj 10	do	do	Gear shifting forks	do
Mj 11	Hydraulics	do	Pump	do
Mj 12	do	do	Valve	do
Mj 13	do	do	Ram cylinder/piston	do
Mj 14	do	do	Lift cover assembly	do
Mj 15	do	do	Cross shaft	do
Mj 16	do	do	Distributor	do
Mj 17	do	do	Three point linkage	do
Mj 18	Wheel assembly	do	Wheel bearing	do
Mj 19	Sheet Metal	do	Operator seat (Structure)	do
Mj 20	do	do	Foot rest	do
Mj 21	do	do	Rear fender	do

NOTE — Any breakage/crackage listed above which is repairable without change of component is treated as minor defects.

ANNEX C

(Clause 5.4)

CATEGORIES OF BREAKDOWNS/DEFECTS (TRACTORS) (Minor Breakdowns)

<i>Code</i>	<i>Aggregate</i>	<i>Critical Defects</i>	<i>Sub-assembly/Part</i>	<i>Applicable Norms</i>
(1)	(2)	(3)	(4)	(5)
Mn 1	Electricals	Malfunctioning	Self start	As under col 3 and 4
Mn 2	do	do	Cut-out	do
Mn 3	do	do	Dynamo/Alternator	do
Mn 4	Engine	Leakage from	Radiator joints	do
Mn 5	do	do	Gaskets	do
Mn 6	do	do	Seals	do
Mn 7	do	do	O-rings	do
Mn 8	do	Burst/cracked	High pressure pipe	do
Mn 9	do	Malfunctioning	Fuel injector	do
Mn 10	Transmission	Leakage from	Gasket	do

<i>Code</i>	<i>Aggregate</i>	<i>Critical Defects</i>	<i>Sub-assembly/Part</i>	<i>Applicable Norms</i>
(1)	(2)	(3)	(4)	(5)
Mn 11	Transmission	Leakage from	Seals	As under col 3 and 4
Mn 12	Hydraulics	do	Gaskets	do
Mn 13	do	do	Seals	do
Mn 14	do	do	O-rings	do
Mn 15	Hydraulic Brake System	do	Gaskets	do
Mn 16	do	do	Seals	do
Mn 17	do	do	O-rings	do
Mn 18	Wheel Assembly	do	Wheel hub	do
Mn 19	Sheet metal	Minor cracks	—	do
Mn 20	System warning gauge	Malfunctioning	Ammeter	do
Mn 21	System warning gauges	Malfunctioning	Water temperature	do
Mn 22	do	do	Engine oil pressure	do
Mn 23	Hydraulics	do	Pump	do
Mn 24	do	do	Valve	do
Mn 25	do	do	Ram cylinder/piston	do
Mn 26	do	do	Lift cover assembly	do
Mn 27	do	do	Cross shaft	do
Mn 28	do	do	Distributor	do

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